

WHAT IS CLAIMED IS:

1. A catalyst support comprising 95 vol% or more of an alkaline-earth metal hexaaluminate, wherein the catalyst support has a surface area of 6 m<sup>2</sup>/g or more.
2. The catalyst support according to Claim 1, wherein the catalyst support comprises 98 vol% or more of the alkaline-earth metal hexaaluminate.
3. The catalyst support according to Claim 1, wherein the catalyst support has a surface area of 12 m<sup>2</sup>/g or more.
4. The catalyst support according to Claim 1, wherein the catalyst support has a surface area of 18 m<sup>2</sup>/g or more.
5. The catalyst support according to Claim 1, wherein the alkaline-earth metal hexaaluminate comprises at least one alkaline-earth metal selected from the group consisting of Ca, Sr and Ba.
6. The catalyst support according to Claim 1, wherein the alkaline-earth metal hexaaluminate comprises BaO•6Al<sub>2</sub>O<sub>3</sub>.
7. A method of making a catalyst support, the method comprising heating at least one precursor oxide in an atmosphere having a partial pressure of O<sub>2</sub> of 0.20 atm or less and containing at least 50 vol% of at least one selected from the group consisting of H<sub>2</sub>, H<sub>2</sub>O and an inert gas; and producing the catalyst support.
8. The method according to Claim 7, wherein the inert gas is selected from the group consisting of He, Ne, Ar, Kr, Xe and N<sub>2</sub>.
9. The method according to Claim 7, wherein the atmosphere contains at least 50 vol% of N<sub>2</sub>.

10. The method according to Claim 7, wherein the heating is performed at a total pressure of 1 atm.
11. The method according to Claim 7, wherein the heating is performed at a total pressure of less than 1 atm.
12. The method according to Claim 7, wherein the heating is performed at a total pressure of greater than 1 atm.
13. The method according to Claim 7, wherein the precursor oxides are heated in an atmosphere containing a partial pressure of O<sub>2</sub> of 0.10 atm or less.
14. The method according to Claim 7, wherein the heating is at a temperature of no more than 1100°C.
15. The method according to Claim 7, wherein the heating is at a temperature of no more than 950°C.
16. The method according to Claim 7, wherein the heating is at a temperature of no more than 800°C.
17. The method according to Claim 7, wherein the at least one precursor oxide comprises a member of the group consisting of alkaline-earth metal oxides.
18. The method according to Claim 7, the method further comprising heating the at least one precursor oxide in another atmosphere having a partial pressure of O<sub>2</sub> greater than 0.20 atm.
19. The method according to Claim 18, wherein  
the other atmosphere is air; and  
the total pressure in the other atmosphere is 1 atm.

20. The method according to Claim 18, wherein the heating in the atmosphere having a partial pressure of O<sub>2</sub> of 0.20 atm or less and the heating in the other atmosphere having a partial pressure of O<sub>2</sub> greater than 0.20 atm are each repeated more than once.

21. A catalyst that can be used for the production of hydrogen from fuel sources containing sulfur, the catalyst comprising  
a catalyst support comprising monoclinic zirconia; and  
Ir on the catalyst support.

22. The catalyst according to Claim 21, wherein the catalyst support has a surface area of 6 m<sup>2</sup>/g or more.

23. The catalyst according to Claim 21, wherein the catalyst support has a surface area of 12 m<sup>2</sup>/g or more.

24. The catalyst according to Claim 21, wherein the catalyst support comprises 95 vol% or more of the monoclinic zirconia.

25. The catalyst according to Claim 21, wherein the catalyst support comprises 98 vol% or more of the monoclinic zirconia.

26. The catalyst according to Claim 21, wherein the Ir is uniformly dispersed on the catalyst support.

27. The catalyst according to Claim 21, wherein  
the catalyst support comprises an inner region and outer region surrounding the inner region; and  
the outer region comprises more Ir than the inner region.

28. The catalyst according to Claim 21, wherein catalyst comprises 0.01 to 6 wt% of the Ir.

29. The catalyst according to Claim 21, wherein catalyst comprises 0.1 to 4 wt% of the Ir.

30. The catalyst according to Claim 21, wherein the catalyst further comprises on the catalyst support another metal that exhibits catalytic activity.

31. The catalyst according to Claim 30, wherein the other metal comprises at least one element selected from the group consisting of Ni, Co and Ru.

32. A method of generating  $H_2$ , the method comprising  
providing a catalyst comprising  
a catalyst support, and  
at least one of Ir, Pt and Pd on the catalyst support;  
passing over the catalyst an active feedstream comprising a gaseous hydrocarbon and gaseous  $H_2O$ ; and  
reacting the gaseous hydrocarbon and the gaseous  $H_2O$  using the catalyst to produce the  $H_2$ , wherein  
the active feedstream comprises 1 ppm by mass or more of S; and  
the catalyst support comprises at least one selected from the group consisting of calcium hexaaluminate, barium hexaaluminate, strontium hexaaluminate, monoclinic zirconia, and mixtures thereof.

33. The method according to Claim 32, wherein the active feedstream comprises 10 ppm by mass or more of S.

34. The method according to Claim 32, wherein the active feedstream comprises 100 ppm by mass or more of S.

35. The method according to Claim 32, wherein Ir is on the catalyst support.

36. The method according to Claim 32, wherein the gaseous hydrocarbon comprises at least one selected from the group consisting of methane, ethane, propane and butane.

37. The method according to Claim 32, wherein the active feedstream further comprises 100 ppm by mass or more of  $O_2$ .

38. The method according to Claim 37, wherein the active feedstream comprises 10 ppm by mass or more of S.

39. The method according to Claim 37, wherein the active feedstream comprises 100 ppm by mass or more of S.

40. The method according to Claim 37, wherein Ir is on the catalyst support.

41. The method according to Claim 37, wherein the gaseous hydrocarbon comprises at least one selected from the group consisting of methane, ethane, propane and butane.

42. The method according to Claim 32, further comprising passing over the catalyst an inactive feedstream comprising at least one of air and gaseous  $\text{H}_2\text{O}$ , wherein the inactive feedstream comprises less than 100 ppm by mass of the gaseous hydrocarbon.

43. The method according to Claim 42, wherein the inactive feedstream comprises 100 ppm by mass or more of  $\text{O}_2$ .

44. The method according to Claim 42, wherein the inactive feedstream comprises 1 vol% or more of  $\text{O}_2$ .

45. The method according to Claim 42, wherein Ir is on the catalyst support.

46. The method according to Claim 42, wherein each of the active feedstream and the inactive feedstream is passed over the catalyst more than once.